RARE TREE SPECIES SUPPORT FUNCTIONAL DIVERSITY IN RESOURCE-ACQUISITION IN CENTRAL AFRICAN FORESTS

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Tropical forests are characterized by a high biodiversity. In the context of identifying processes underlying the maintenance of species diversity, we examine the relationship between the rarity of tree species and their contribution to functional diversity (FD) at a central location in the tropical rainforest of the Congo Basin.

FD indices are assessed using a set of functional traits representing unique contributions to plant resource capture and growth, namely wood density, specific leaf area, leaf nitrogen content and leaf carbon isotope composition. Tree species covering a cumulative 95% basal area in 5 1ha plots are included in the analysis, with a total of 738 individual trees being sampled, covering 105 species. For each species, the contribution to FD is determined by assessing the extremity of species trait locations within the functional trait space and by quantifying the distance between functional characteristics of different species or functional distinctiveness. The relationship between these measures and the rarity of the species in the tree communities are determined.

Our main finding is that rare species support the trait combinations with the highest functional distinctiveness. Rare species however cover the entire range of low and high functional distinctiveness, contributing both unique and redundant functions. Common species only show a low contribution to FD but are crucial for aboveground carbon storage. We argue that within carbon sequestration initiatives, inclusion of both FD and biodiversity conservation is imperative not only for conservation purposes but also to sustain the stability of the ecosystem.